This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims

1. (currently amended) A method for generating parametric audio output based on at least one of a) interaction of a modulated ultrasonic carrier vibration with air as a non-linear medium of propagation, and b) interaction of ~~multiple~~ a plurality of ultrasonic frequencies within air as a nonlinear medium, said method comprising the steps of:

a) generating an electronic signal comprising at least one of a) a modulated ultrasonic carrier signal, and b) at least two ultrasonic signals having a difference in frequency value which falls within an audio frequency range;

b) transferring the electronic signal to an electro acoustical transducer film diaphragm which couples directly with the air as part of a single stage energy conversion process, said film being continuous over a length of at least ten wavelengths of the electrical signal at its lowest frequency value;

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c) converting the electronic signal at the film diaphragm directly to mechanical displacement, said film acting as a driver member of a parametric speaker at an ultrasonic frequency of vibration; and

d) mechanically emitting ~~the at least two ultrasonic signals~~ the content of the electronic signal from the film diaphragm into the air as ultrasonic compression waves which interact ~~within~~ with the air medium to generate the parametric audio output.

2. (previously amended) A method as defined in claim 1, wherein step b) comprises the more specific step of transferring the electronic signal to an electrostatic film transducer.

3. (previously amended) A method as defined in claim 1, wherein step b) comprises the more specific step of transferring the electronic signal to an electret film transducer.

4. (previously amended) A method as defined in claim 1, wherein step b) comprises the more specific step of transferring the electronic signal to a thermally formed electro mechanical film diaphragm as the electro acoustical transducer film diaphragm.

5. (previously amended) A method as defined in claim 1, wherein step b) comprises the more specific step of transferring the electronic signal to a piezo film diaphragm as the electro acoustical transducer film diaphragm.

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6. (previously amended) A method as defined in claim 1, wherein step b) comprises the more specific step of transferring the electronic signal to a planar magnetic film diaphragm as the electro acoustical transducer film diaphragm.

7. (previously amended) A method as defined in claim 2, wherein step b) comprises the more specific step of transferring the electronic signal to an electrostatic backplate having a surface configuration comprising circular v grooves operable as a stator member with respect to the film diaphragm.

8. (original) A method as defined in claim 4, wherein step b) comprises the more specific step of transferring the electronic signal to a piezo film diaphragm having a configuration of a rectified sine

form.

9. (original) A method as defined in claim 8, wherein step b) comprises the more specific step of transferring the electronic signal to a piezo film diaphragm which is supported by a backplate having a configuration of a rectified sine form.

10. (original) A method as defined in claim 4, wherein step b) comprises the more specific step of transferring the electronic signal to a piezo film diaphragm having a configuration of a sinusoidal form.

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11. (original) A method as defined in claim 10, wherein step b) comprises the more specific step of transferring the electronic signal to a piezo film diaphragm which is supported by a backplate having a configuration of a sinusoidal form.

12. (cancelled)

13. (cancelled)

14. (previously amended) A method as defined in claim 4, further comprising the step of selecting a transducer film diaphragm having a convex curvature which generates a diffuse radiation pattern for emission of the parametric output.

15. (previously amended) A method as defined in claim 4, further comprising the step of selecting a transducer film diaphragm having a concave curvature which generates a focused radiation pattern for emission of the parametric output.

16. (previously amended) A method as defined in claim 4, further comprising the step of selecting a transducer film diaphragm having a dipolar propagation mode for which generates a diffuse radiation pattern for emission of the parametric output.

17. (previously amended) A method as defined in claim 4, further comprising the step of spacing the transducer film diaphragm a quarter wave distance from a supporting backplate.

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18. (currently amended) A method as defined in claim 1, further comprising the step of selecting a transducer film diaphragm having a one-half wave length distance at a carrier frequency between peak ~~to~~ and trough of a sinusoidal form for the diaphragm.

19. (previously amended) A method as defined in claim 4, further comprising the step of providing a dimpled transducer film diaphragm comprising a monolithic sheet of film having concave dimples in closely spaced, side by side array which generates a substantially uniform and homogenous radiation pattern for emission of the parametric output across the surface of the film diaphragm.

20. (currently amended) A speaker device for generating parametric audio output based on at least

one of a) interaction of a modulated ultrasonic carrier vibration with air as a non-linear medium of propagation, and b) interaction of multiple ultrasonic frequencies within air as a nonlinear medium, said device comprising:

a) a parametric signal generation system including an ultrasonic signal source, an audio signal source, and a modulating device coupled to the ultrasonic and audio signal sources for mixing the ultrasonic and audio signals for generating a resultant electronic signal comprising at least one of a) a modulated ultrasonic carrier signal, and b) at least two ultrasonic signals having a difference in frequency value which falls within an audio frequency range;

b) an electro acoustical transducer film diaphragm coupled to the parametric signal generation system which also couples directly with the air as part of a single stage energy conversion process, said film diaphragm being large with respect to the lowest ultrasonic frequency used and having a dimension at least ten times the wavelength at said frequency ; and

c) support structure for positioning and stabilizing the film diaphragm to enable mechanical displacement of the film diaphragm as a driver member of a parametric speaker.

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21. (previously amended) A device as defined in claim 20, wherein the transducer film diaphragm comprises an electrostatic transducer.

22. (previously amended) A device as defined in claim 20, wherein the transducer film diaphragm comprises an electret transducer.

23. (previously amended) A device as defined in claim 20, wherein the transducer film diaphragm

comprises a piezo film diaphragm as the electro acoustical transducer film diaphragm.

24. (previously amended) A device as defined in claim 20, wherein the transducer film diaphragm comprises a thermally formed electro mechanical film diaphragm as the electro acoustical transducer film diaphragm.

25. (previously amended) A device as defined in claim 20, wherein the transducer film diaphragm comprises a magnetic film diaphragm as the electro acoustical transducer film diaphragm.

26. (previously amended) A method as defined in claim 1, wherein step b) comprises the more specific step of transferring the electronic signal to a plastic film diaphragm as the electro acoustical transducer film diaphragm.

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27. (previously amended) A method as defined in claim 1, wherein step b) comprises the more specific step of transferring the electronic signal to a polyvinylidiene di-flouride (PVDF) diaphragm as the electro acoustical transducer film diaphragm.

28. (currently amended) A ~~method~~ device as defined in claim 20, wherein the transducer film diaphragm further comprises a plastic film diaphragm as the electro acoustical transducer film diaphragm to emit ultrasonic signals.

29. (previously amended) A device as defined in claim 20, wherein the transducer film diaphragm further comprises a polyvinylidiene di-flouride (PVDF) diaphragm as the electro acoustical transducer film diaphragm to emit ultrasonic signals.

30 ~~117~~. (new) A method for enabling parametric generation of audio output in an air medium, the method comprising the steps of:

providing for parametrically creating an audio frequency range sound output in air based on an audio input signal by means of a higher frequency carrier vibration in the air medium, further comprising at least one of: a) modulating a higher frequency carrier signal; and, b) combining a plurality of higher frequency signals,

facilitating generating at least one electronic signal that can give rise to creation of an audio frequency range sound output in an air medium by interaction of sound waves from said higher frequency vibration with the air medium;

enabling transference of the electronic signal to a transducer including a thin film that is coupled directly to the air medium, said thin film being relatively large compared to ultrasonic frequency wavelengths and having a dimension at least ten times the wavelength of the lowest frequency of the higher frequency carrier vibration to be used;

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enabling conversion of the electronic signal at the diaphragm directly to vibration of the air medium by means of movement of the film thereby facilitating creation of a parametric audio frequency range sound output in air from the higher frequency carrier vibrations of air imparted by the film.

31 ~~118~~. (new) A method as set forth in claim 30 ~~117~~, further comprising the step of providing said thin film as part of a transducer selected from the group of types consisting of: electrostatic; electret; piezo-electric; and planar-magnetic.

32 ~~119~~. (new) A method as set forth in claim 30 ~~117~~, further comprising the step of providing the film with a plurality of curved surface portions which sized to be not more than a wavelength of the lowest frequency of the higher frequency to be used across a narrowest dimension.

33 ~~120~~. (new) A method as set forth in claim 32 ~~119~~, comprising the further step of thermo-forming the curved portions of the film.

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~~121~~. (new)A method as set forth in claim 33 ~~120~~, comprising the further step of providing a support substrate including ridges to which the film is attached between curved portions.

35
~~122~~. (new) A method as set forth in claim 32 ~~119~~, further comprising the step of configuring the curved portions in one of a sinusoidal and a rectified sinusoidal shape.

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~~123~~. (new) A method as set forth in claim 30 ~~117~~, comprising the further steps of

providing the film as part of a piezoelectric transducer, wherein the film is electrically responsive;

configuring the film to have at least one curved portion, facilitating audio reproduction when the film responds dimensionally to an electrical signal.

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~~124~~. (new) A method as set forth in claim 36 ~~123~~, wherein the film is pressure biased.

38
~~125~~. (new) An apparatus for parametric reproduction of audio program material in an air medium, comprising:

a signal source configured to generate a parametric electronic signal at a higher frequency range which is based on at least one higher frequency carrier signal and at least one audio program signal;

an emitter operably coupled to the signal source, the emitter further comprising a film structure which is at least ten wavelengths of the carrier signal at its lowest continuously operating frequency, including a thin film in contact with the air medium disposed over essentially all of an area of said large area film structure, said thin film thus being directly coupled to the air medium, the emitter being configured to impart higher frequency sound waves into the air medium, which sound waves in turn give rise to audio frequency range sound output created within the air medium by interaction of the higher frequency range sound output with the air medium, which audio frequency range sound output reproduces the audio program material sought to be reproduced.

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39 ~~126~~. (new) An apparatus as set forth in claim 38 ~~125~~, wherein the emitter including said film structure is selected from the group of types consisting of: electrostatic; electret; piezoelectric; and planar-magnetic.

40 ~~127~~. (new) An apparatus as set forth in claim 38 ~~125~~, wherein the emitter further comprises a back plate which cooperates with the film structure, said back plate having areas in contact with the film structure and areas not in contact with the film structure.

41 ~~128~~. (new) An apparatus as set forth in claim 40 ~~127~~, wherein the film is an electrically responsive film.

42 ~~129~~. (new) An apparatus as set forth in claim 41 ~~128~~ wherein the emitter is of the piezoelectric type.

43 ~~130~~. (new) An apparatus as set forth in claim 42 ~~129~~, wherein the film structure is pressure biased.

44 ~~131~~. (new) An apparatus as set forth in claim 38 ~~125~~, wherein the film includes a plurality of curved portions.

45 ~~132~~. (new) An apparatus as set forth in claim 44 ~~131~~, wherein the curved portions have a shape that is one of sinusoidal and rectified sinusoidal.

46 ~~133~~. (new) A parametric emitter system, comprising:

A signal source configured to actuate a parametric emitter to parametrically generate an audio frequency range audio output in an air medium in accordance with a parametric electronic signal which is a higher frequency signal based on an audio frequency range signal containing audio program material to be reproduced when said parametric electronic signal is passed to the emitter;

An emitter configured to generate said audio frequency range audio output in the air medium from a higher frequency vibrational output, further comprising a thin film diaphragm structure, said structure being in direct contact with the air medium and sized so that it is large

enough in comparison to the lowest higher frequency vibrational output wavelength to be created that the higher frequency vibrational movement of the diaphragm creates a beam, in which beam audio-range sound output is created and outside of which audio frequency range output is not created.

47 ~~134~~. (new) An apparatus as set forth in claim 46 ~~133~~, wherein the emitter including said film structure is selected from the group of types consisting of: electrostatic; electret; piezoelectric; and planar-magnetic.

48 ~~135~~. (new) An apparatus as set forth in claim 46 ~~133~~, wherein the film structure is continuous over a distance of at least ten wavelengths of the higher frequency signal at its lowest operating frequency.

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49 ~~136~~. (new) An apparatus as set forth in claim 48 ~~135~~, wherein the emitter comprises a back plate and the film structure is attached to the back plate at a multiplicity of locations and is free to move at a multiplicity of locations.

50 ~~137~~. (new) An apparatus as set forth in claim 46 ~~133~~, wherein the film structure is pressure biased.

51 ~~138~~. (new) An apparatus as set forth in claim 46 ~~133~~, wherein the film includes a plurality of curved portions.

52 ~~139~~. (new) An apparatus as set forth in claim 51 ~~138~~, wherein the curved portions have a shape that is one of sinusoidal and rectified sinusoidal.

53 ~~140~~. (new) A method of creating a beam of audio frequency sound in an air medium, comprising:

providing a parametric signal source;

creating a parametric electronic signal so as to be available at said source which is at least one of a modulated higher frequency carrier signal and a plurality of higher frequency signals which contain audio program information to be reproduced at a lower frequency in the beam in

the air medium;

providing a parametric emitter which comprises a thin film which is directly coupled to the air medium, said film being large compared to a lowest operating frequency wavelength to be reproduced based on the parametric electronic signal and at least ten wavelengths at said lowest operating frequency across said film in at least one dimension;

configuring the emitter to connect to and receive the parametric electronic signal from the parametric signal source; and,

parametrically generating the beam of audio frequency sound in the air medium.

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54 ~~141~~. (new) A method as set forth in claim 53 ~~140~~, further comprising the step of providing said emitter selected from the group of emitter types consisting of: electrostatic; electret; piezoelectric; and planar-magnetic.

55 ~~142~~. (new) A method as set forth in claim 54 ~~141~~, comprising providing an undulating surface of said film, including closely spaced concave portions.

56 ~~143~~. (new) A method as set forth in claim 55 ~~142~~, wherein the step of providing includes selecting an emitter of the piezoelectric type, and further comprising the step of pressure biasing the thin film.

57 ~~144~~. (new) A method as set forth in claim 53 ~~140~~, further comprising the step of selecting a thin film which comprises a polyvinylidiene di-flouride material.

58 ~~145~~. (new) A method as set forth in claim 53 ~~140~~, further comprising the step of forming at least one of a convex curvature and a concave curvature in the thin film.

59 ~~146~~. (new) An apparatus as set forth in claim 58 ~~145~~, wherein a curvature has a shape that is sinusoidal.